ECOLOGICAL RESTORATION

The Restoration of the Mattole River and its Salmon Spawning Grounds

Ecological restoration renews and maintains ecosystem health by repairing damage caused by humans to indigenous ecosystems.

Beginning with the perception that populations of native salmon were diminishing at an alarming rate, reinhabitants of the lower Mattole River (the part of that river basin that interacts directly with the Pacific Ocean in Northern California) have taken concrete steps to regenerate salmon spawning grounds. This has been accomplished by helping to restore a river severely damaged by sedimentation because of industrial logging.

Why is sedimentation a culprit? Because when silt washes into the Mattole, it displaces the clean gravel in the riverbed, altering the amount of oxygen in the water and the river's temperature. The result? Salmon eggs suffocate before they can hatch.

Where does the sedimentation come from? For the most part, from the clear cutting of forests and the roads built to move out the fallen timber. Trees and understory vegetation hold soil in place, especially on steep slopes, so in their absence, when the long and strong winter rains come, extensive soil erosion results with silt finding its way into the river.

The Riparian Desert Near to the Mouth of the Mattole River

The longer term result of the silt buildup? Extensive gravel bars that, after growing and joining with each other, make up what is locally called a riparian desert. Using the word "desert" is not hyperbole, because the absence of soil and the hot, dry conditions that sedimentation brings with it make restoration efforts more complicated and formidable.

As with much environmental damage, the causes are often discernible and linear. For example, a fairly direct line can be drawn from the clear cutting of forests to the fouling of the salmon spawning grounds. The restoration of the river environment so salmon can flourish, though, entails getting inside and intimate with ecological process which is complex and circular, subtle and often counter- intuitive to industrial eyes.

Where do we begin engaging local natural process so it is translatable into practical restoration activities? Freeman House offers useful advice:

> Build on the resiliency of natural systems to heal themselves. For example, if sedimentation from the clear cutting of forests and road building are fouling rivers and spoiling salmon spawning grounds, then systemically work to reduce potential sediment sources so that the waters could, over time, flush their beds clean.
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> Find the points at which nature's resiliency can be augmented. Consider creating stable riparian areas adjacent to rivers cleansing themselves.

Restoring Riparian Edges

These basics were translated into the Lower Mattole River Riparian Enhancement Project as designed and undertaken by the Mattole Restoration Council. In the words of the Council, the goal of this project was to "enhance riparian and floodplain habitat for fish and wildlife species in the Lower Mattole River and Estuary by: increasing riparian edge habitat; increasing bank stability; decreasing sediment inputs; providing in-stream salmonid habitat; increasing riparian shade; and increasing large wood inputs."

You can get a sense of the level of effort and commitment demanded to reach this goal by understanding the more concrete project elements. Plant 22,500 riparian plants (propagated at the Council's Native Plant Nursery with seed collected from nearby sites) on 100 acres of sedimented floodplain and tend for five years to help create riparian edges. Build 13,000 running feet of livestock fencing so riparian plantings are not damaged. Plant 16,000 willow cuttings, 10 to 20 feet in length, in 16,000 feet of dug trenches to provide structure and moisture fortifying the riparian edges.

Salmon Habitat Restoration

For the fishing runs of the Lower Mattole River to gradually recover, the spawning habitat had to come more alive. Cool shaded water with oxygen provided by large woody debris was cabled into place to instill complexity in waterways that had been simplified by flooding.

What insights can be garnered from the restoration experiences in the Mattole River Basin?

> Look beyond environmental protectionist attitudes to a "we are embedded in ecology" sensibility. Build upon "Don't foul your own nest" awareness.
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> Priuses and solar panels, green building as well as demonstrations and letters to Congress will remain part of good biospheric citizenship. But these activities and acquisitions will not be enough by themselves to lead us in the directions we need to go, which is toward a human culture guided by the restraints and opportunities of their local ecosys tems.
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> The conceptual language of bioregionalism and reinhabitation finds its anchorage in community based restoration projects and local efforts to meet basic needs with earth-oriented cultures and practices.
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> Ecological restoration can be a community art form that stimulates the imagination for other possibilities.

Restoration, as cultural practice and technic, shares much with good organic farming. Outside and in the circle of life, restoration work rests on careful observation and unfolds best when natural diversity flourishes while human needs are satisfied.

The Daylighting and Restoration of Rivers and Creeks

Daylighting combines the restoration of natural landscapes and habitat conservation areas with a green infrastructure program that can help with stormwater run-off and the improvement of water quality. The neighborhood becomes a more beautiful place to live and work benefiting nearby businesses (while generating jobs, especially for the lucky ones who tend to the maintenance of the daylighted river). From the essential perspective of living-in-place, daylighting can help foster the elementary association with, and sanctification of, the hydrological cycle as an everyday experience.

The Daylighting of the Saw Mill River

Coming to the Surface

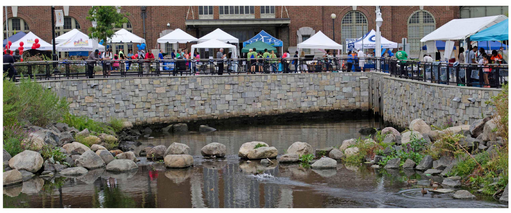
Looking Downstream

The Saw Mill River is a tributary of the Hudson River, part of which flows through Yonkers, a city that directly borders the Bronx, just north of Manhattan. As with Yonkers, the history of cities has much to do with how flowing waters are controlled. Inside most urban environments, the current approach is to bury the smaller natural water network believing that is the best way to manage it as a potential hazard. The result is that this network is a ghost in the lives of most city people even though it is what makes life possible. That's why the daylighting of streams and creeks—their release from underground pipes and culverts to the surface—should be viewed as realistic opportunities especially when underground channels need replacement or repair.

In December 2010, Yonkers completed its first daylighting phase of the Saw Mill River by resurfacing it from underneath a parking lot in its downtown district. Daylighting strives to recreate natural stream ecology, usually with historic hydrologic conditions, that are joined, with native vegetation, to adjacent riparian corridors and habitat.

As part of its overall design, the daylighting includes, along with the stream restoration, the creation of aquatic habitat for migratory fish. In this case, American eel, white perch, and herring, which passage through rock structures called "riffles" and fish ladders.

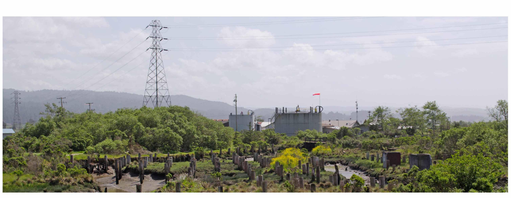
Looking Upstream from the Fish Ladder



Going Back Underground

The Restoration of Polluted Lands

Brownfield Restoration and Sewage Treatment in Arcata, Northern California



The City of Arcata's approach to sewage treatment straddles the worlds of landscape restoration and urban climax sustainability. Derelict and abandoned areas near Humboldt Bay were restored to a number of secondary waste treatment wetlands and water quality enhancement marshes.

After primary waste treatment, wastes are routed through the wetlands and marshes further cleansing them before entering Humboldt Bay. The wetlands and marshes, while providing additional sewage treatment, also create wildlife habitats and walking trails (appropriately named the Arcata Marsh and Wildlife Sanctuary).

Construction of the entire project was substantially completed in 1986. Refinements continue though, based on experience, as to the better design of the ecological side of the waste treatment process. This learning process, now taking place over decades, guides a holistic approach to meeting Arcata's basic need for water treatment. Why not include landscape restoration and habitat conservation directly into our thinking about infrastructure building and repair? Especially when it turns out to be more energy efficient and fiscally prudent while encouraging placed-based associations with the natural surround.

Interestingly enough, the lines dividing the physical Arcata Wastewater Treatment Plant and the biological Arcata Marsh and Wildlife Sanctuary are fading, yielding not only clean water but a design process that integrates the human with the ecological in practical terms.